SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

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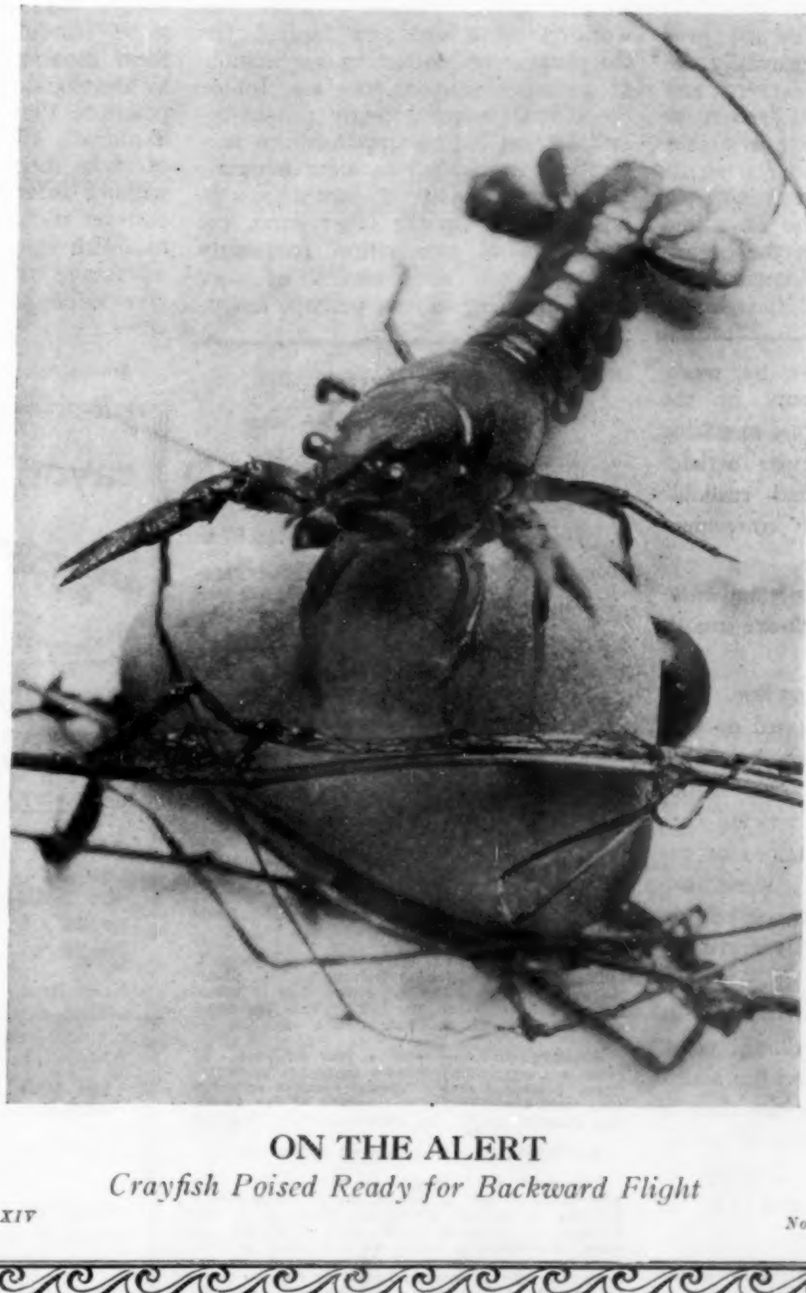

ON THE ALERT

Crayfish Poised Ready for Backward Flight

Vol. XIV No. 388

Fear As Medicine

Medicine

A medical progress note prepared by the American Association for Medical Progress.

It may be true that fear of the Lord is the beginning of wisdom. Unfortunately, most of us are unable to distinguish between fear of the Lord and fear of the Devil. In our struggles to make other people or children conform to our notions of propriety we are tempted to rely upon fear. "It stands to reason" that people will avoid conduct that involves disagreeable penalties, or that they will do what they must to avoid penalties. It may be, however, that we appeal to fear only for lack of better technique.

From the point of view of promoting health, it seems especially deplorable that parents, teachers and health officers continue to resort to fear, when other means are available, since the inculcation of fear is in itself an assault upon the health of human beings. Those who have had the greatest experience in the organized effort to combat the venereal diseases long ago abandoned the gallery of horrors as an educational instrument. During the short experience that our health workers had with the American army in the World War it was discovered that the effectiveness of fear in preventing venereal diseases was just about counterbalanced by its effectiveness in developing neuroses. A knowledge of bacteria may be helpful for avoiding infections; but we need not have the kind of knowledge that culminates in bacteriophobias.

The propaganda against the extension of public health measures occasionally attacks health officers for working up a smallpox "scare" for the purpose of promoting vaccination. If serious smallpox does not follow the official warning many people resent having been stampeded into vaccination, which they consider unnecessary except in the presence of a serious danger. On the other hand, the opponents of vaccination frequently alarm people with stories of sore arms, lingering illness, perhaps amputations, and even death, "following vaccination". Of course, in addition to promoting neuroses, these stories are effective for the immediate purpose of obstructing vaccination. In any case the public is confused by the appeal to fear; and in the long run a confused public cannot be relied upon to act intelligently in a difficult situation.

That other means of attaining the desired end are available every mature person can see for himself in such facts as these: Accidents in industry have been radically reduced in recent years, not by making workers more fearful, not even by making them consciously more cautions, but by developing routine equipment and practices that reduce accidents to a minimum. Civilized human beings go on about their affairs years at a stretch without infections, without blunders, and yet without trepidation. We can establish standard practice that takes advantage of our knowledge and that lays aside hampering and confusing fears.

Science News-Letter, September 15, 1928

INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

The *clippability, indexing,* and *automatic dating* of each article are unique features.

This is a *separable* magazine. Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically *indexed* by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically *dated* by its last line.

In This Issue—

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularisation of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science. *Medical Progress* is merged into the SCIENCE NEWS-LETTER.

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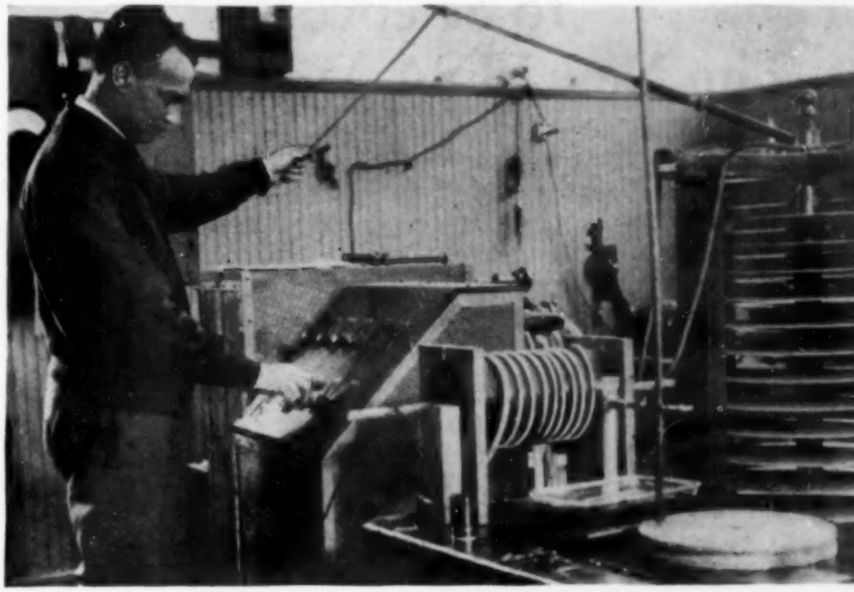
Watching the "Death Whisper" Kill

Physics—Biology

By Frank Thone

A sound too shrill to be heard by any ear, rending to death living things too small to be seen with the unaided eye, is the newest thriller in the field of science. "The Death Whisper" it has been nicknamed. Deadly it certainly is, for the instant its "ray" of waves enters a living cell the protoplasmic content is violently disturbed and finally disrupted and destroyed. But to call it a whisper is an exaggeration, for even a whisper is a sound, and this terrific force works in utter silence. Though it is composed of sound waves, one has to watch it rather than listen to it.



ALFRED L. LOOMIS operating the powerful supersonic apparatus in his laboratory at Tuxedo Park, N. Y.

Watching it is impressive enough, even dramatic. Under the microscope the cells of a plant, far too small to see with the naked eye, appear to be an inch or two in length, and all the details of their structure are plainly visible. One can see the slow, steady streaming of the protoplasm, that strange gelatinous substance that is the physical basis of life. One can see as tiny, separate, neatly arranged particles the green stuff that gives most plants their color. The undisturbed cell is a placid, peaceful, unworried thing.

Then an electric circuit is closed, and the whole picture instantly changes. The water in which the cells are floating becomes violently perturbed, trembling as though it were being subjected to a kind of continuous explosion. The bit of plant tissue shivers and shifts about as though it were being torn at by a thousand tiny, violent hands. Particles of debris are whirled into little eddies. Within the cell the first touch of the soundless waves stops the quiet streaming of the protoplasm as though it were paralyzed. Then the motion begins again, but it is not the same as before. It is faster, unnatural, forced, dizzy. The substance of life is dancing a dance of death. Faster and faster it whirls, sweeping the green particles with it. Fragments become detached and spin as separate globules in the interior sap cavity of the cell. At last everything is broken down; anarchy has succeeded order, life has been swallowed up in death.

So delicately can the process be controlled, however, that it can be stopped short at any point desired, before the death point is reached, just as it is possible to administer strychnine or arsenate in such small quantities that they will act as medicines instead of poisons. This makes it possible to use this strange force as a scientific tool for the study of life, and this is one of the reasons why physicians and biologists are so much interested in it at present. And after understanding comes control; so that eventually the "Death Whisper" may become an important weapon in man's campaign for the subjugation and dominion of the earth, which was commanded to our grandfather Adam.

Like all new things under the sun, these supersonic waves tie back to an origin in something old. It is nearly a half-century now since Pierre Curie, later famous as the co-discoverer with his wife of the element radium, working with his brother in Paris, found that certain crystals would produce electricity if they were squeezed hard enough. They learned also that the converse was true, that if electricity were fed into the crystals they would expand. Rapidly oscillating currents, they found, would produce rapid alternations of expansion and contraction in the crystals, and this vibration gave rise to sound waves. This phenomenon was named "piezo-electricity"; it might have been kept out of Greek by calling it simply "squeezo-electricity".

These "talking" piezo-electric crystals remained for many years simply interesting laboratory toys. Then, during the World War, a French physicist, named Langevin, saw a possible use for them as a means for detecting submarines. Prof. Langevin was experimenting with his crystals in a large tank at the great French arsenal at Toulon, when it was noticed that small fishes that happened to be in the way of the supersonic waves were killed.

There was at the arsenal at that time an American scientist, Prof. R. W. Wood of the Johns Hopkins University. Prof. Wood combines two things that make for success in a scientist: the ability to notice quickly apparently trivial occurrences, and an intense curiosity for getting at their causes. He noticed the dead fish, and asked why they died. Nobody could guess. So he put his hand into the water—and promptly jerked it out again. He had not got an electric shock, but simply an instantaneous sensation of most intolerable pain. Later he tried it again, with a much milder current, and this time felt only a gentle sensation of warmth penetrating his whole hand.

But in 1917 there was no time for following up so promising a lead, and Prof. Wood simply put the idea away in the back of his head until the war was over. Some time after peace had returned, he took it up again, with a New York (*Turn to page* 159)

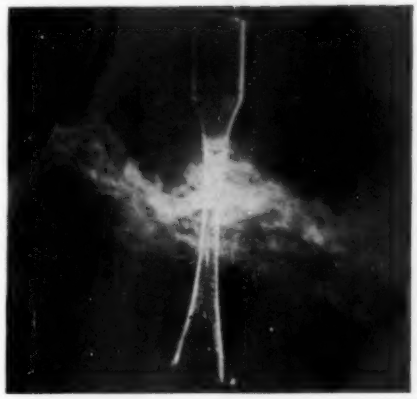
Watching the Death Whisper Kill—*Continued*

friend, Alfred L. Loomis. Mr. Loomis is a man of considerable means and a banker by profession, but he has made science, particularly physics, his avocation to such an extent that it would be a grave understatement to call it his hobby. He has the passion for apparatus of precision, the delight in its accurate manipulation, that is the mark of the born experimental physicist. He already had to his credit several successful inventions in the field of heavy ordnance, one of which, now known as the Aberdeen chronograph, is still an indispensable instrument for the testing of artillery at the Army proving grounds.

With Prof. Wood's cooperation, Mr. Loomis established a private laboratory near his home at Tuxedo Park, where the two men and a small group of other scientists have spent their spare time working on some of the newer forces in physics and their applications to living animals and plants. For the production of supersonics they assembled a most formidable apparatus. An oscillator such as is used in the larger radio stations, with two kilowatts' capacity, and tunable to frequencies of from 100,000 to 500,000 per second, was the heart of it. Through this machine voltages as high as 50,000 were impressed on the piezo-electric crystals.

It was found immediately that at such power and so high a vibration rate the crystals could not stand up to their task in air. They had to be kept immersed in oil to keep them from shattering themselves under the strain. When the current is turned into one of these oil-drowned crystals through a thin sheet of metal laid on either side, the resulting "ray" of inaudible sound immediately piles itself up into a steep-sided little liquid sound like a miniature volcano.

The first experiments on living things were performed before the apparatus was adapted for use under the eye of the microscope. Fish, tadpoles, little frogs were subjected to its lethal influence. A few convulsive struggles, and they floated to the surface, dead. Single-celled animals, such as swarm in stagnant water, were paralyzed and finally disintegrated and vanished. Plants proved more resistant, and for a time it was thought that they were immune to the action of the waves. But finally it was found that the fine, silky stuff, known as Spirogyra, common in stagnant and slowly flowing water, could be killed



A GLASS TUBE covered with oil and set to vibrating with supersonic waves, hurls the oil off in a smoke-like spray

and its cells broken up in a vessel of water held above the vibrating crystal. Bacteria could not be harmed at all. Blood corpuscles were destroyed in a very short time, when exposed in a test tube; and a mouse was given a severe case of artificial anemia by "raying" it as it swam in a beaker of water. Strangely enough, the mouse seemed to experience no discomfort during the "raying", in contrast to the convulsive struggles of the fish and other lower animals, and it subsequently recovered very rapidly from its anemia.

These anomalies in the behavior of different organisms exposed to the supersonic waves led Mr. Loomis to construct the special apparatus which permits the crystal to be placed directly under the microscope, permitting the action of the waves on the cells to be watched while they are at work. The power used in this new set is much less than it is in the first apparatus, so that the crystal does not need to be immersed in oil. It is laid on the stage of the microscope. The first work with this new weapon of research—"microsupersonic" apparatus would seem an appropriate name—was done at the Loomis Laboratory at Tuxedo, for this was the only place in the world where there were facilities for supersonic wave production at very high frequencies. But Mr. Loomis has now constructed for his friend, Prof. R. B. Harvey, a duplicate of the first microsupersonic set, which has been installed in the biological laboratory at Princeton University, and here the fascinating researches on the biological effects of these soundless sounds is now going forward.

At the University of California a group of investigators, Dr. F. O. Schmitt, Prof. A. R. Olson and Dr. C. H. Johnson, have been conducting some supersonic researches of their own. They also have subjected living things to the disruptive power of inaudible waves up to rates of 750,000 a second. Large protozoa have had their fringes of waving appendages torn off, and in the end have been violently burst asunder. Their protoplasm has been coagulated as though by heat or extreme pressure.

The California researchers have tried out the supersonic waves from a new angle. They have conducted them along microscopically fine-drawn threads of glass, and have touched various living creatures with these vibrating needles. Whatever one of these glass points touches it sears as though it were hot; laid across the body of a flatworm a supersonic needle cuts through it like a knife. At Berkeley as at Tuxedo Park, research is being continued on the physical and chemical effects of the waves.

Among the strangest of the phenomena observed in the supersonic experiments have been the effects of the waves upon liquids which do not usually mix with water. Oil and water were easily driven into a practically permanent emulsion by the waves, and even mercury was sprayed upward into water, forming an inky fluid that stood for several days before separating into its component liquids again. Light liquids, like benzol, were sprayed into a fine mist, almost like smoke, the instant the waves reached them.

On these and a number of more abstruce problems the scientific groups at Tuxedo and Berkeley are still at work, and the programs they have mapped out for themselves will probably keep them busy for many years. The possibilities of supersonic waves have only begun to be suspected; it would require a bold imagination, even in a scientist, to guess what may lie around the corner, to say nothing of what may be brought by the more distant future.

Science News-Letter, September 15, 1928

The new German Zeppelin airship LZ-127 is 772 feet long and is the largest Zeppelin that has been built.

The solar system to which the earth belongs contains seven planets, 25 satellites, and over 1,000 planetoids.

CLASSICS OF SCIENCE: The Moons of Jupiter

Astronomy

Sidereus Nuncius (The Sidereal Messenger), by Galileo Galilei, Venice, 1610; Tr. by Edward Stafford Carlos, London, 1880.

Jupiter's Satellites

On the 7th day of January in the present year, 1610, in the first hour of the following night, when I was viewing the constellations of the heavens through a telescope, the planet Jupiter presented itself to my view, and as I had prepared for myself a very excellent instrument, I noticed a circumstance which I had never been able to notice before, owing to want of power in my other telescope, namely, that three little stars, small but very bright, were near the planet; and although I believed them to belong to the number of the fixed stars, yet they made me somewhat wonder, because they seemed to be arranged exactly in a straight line, parallel to the ecliptic, and to be brighter than the rest of the stars, equal to them in magnitude. The position of them with reference to one another and to Jupiter was as follows:

On the east side there were two stars, and a single one towards the west. The star which was furthest towards the east, and the western star, appeared rather larger than the third.

I scarcely troubled at all about the distance between them and Jupiter, for, as I have already said, at first I believed them to be fixed stars; but when on January 8th, led by some fatality, I turned again to look at the same part of the heavens, I found a very different state of things, for there were three little stars, all west of Jupiter and nearer together than on the previous night, and they were separated from one another by equal intervals, as the accompanying illustration shows.

At this point, although I had not turned my thoughts at all upon the approximation of the stars to one another, yet my surprise began to be excited, how Jupiter could one day be found to the east of all the aforesaid fixed stars when the day before it had been west of two of them; and forthwith I became afraid lest the planet might have moved differently from the calculation of astronomers, and so had passed those stars by its own proper motion. I therefore waited for the next night with the most intense longing, but I was disappointed of my hope, for the sky was covered with clouds in every direction.

But on January 10th the stars appeared in the following position with regard to Jupiter; there were two only, and both on the east side of Jupiter, the third, as I thought, being hidden by the planet. They were situated just as before, exactly in the same straight line with Jupiter, and along the Zodiac.

When I had seen these phenomena, as I knew that corresponding changes of position could not by any means belong to Jupiter, and as, moreover, I perceived that the stars which I saw had always been the same, for there were no others either in front or behind, within a great distance, along the Zodiac—at length, changing from doubt into surprise, I discovered that the interchange of position which I saw belonged not to Jupiter, but to the stars to which my attention had been drawn, and I thought therefore that they ought to be observed henceforth with more attention and precision.

Accordingly, on January 11th I saw an arrangement of the following kind, namely, only two stars to the east of Jupiter, the nearer of which was distant from Jupiter three times as far as from the star further to the east; and the star furthest to the east was nearly twice as large as the other one; whereas on the previous night they had appeared nearly of equal magnitude. I therefore concluded, and decided unhesitatingly, that there are three stars in the heavens moving about Jupiter, as Venus and Mercury round the Sun; which at length was established as clear as daylight by numerous other subsequent observations. These observations also established that there are not only three, but four, erratic sidereal bodies performing their revolutions round Jupiter, observations of whose changes of position made with more exactness on succeeding nights the following account will supply. I have measured also the intervals between them with the telescope in the manner already explained. Besides this, I have given the times of observation, especially when several were made in the same night, for the revolutions of these planets are so swift that an observer may generally get differences of position every hour.

January 12.—At the first hour of the next night I saw these heavenly bodies arranged in this manner. The satellite furthest to the east was greater than the satellite furthest to the west, but both were very conspicuous and bright; the distance of each one from Jupiter was two minutes. A third satellite, certainly not in view before, began to appear at the third hour; it nearly touched Jupiter on the east side, and was exceedingly small. They were all arranged in the same straight line, along the ecliptic.

January 13.—For the first time four satellites were in view in the following positions with regard to Jupiter.

There were three to the west, and one to the east; they made a straight line nearly, but the middle satellite of those to the west deviated a little from the straight line towards the north. The satellite furthest to the east was at a distance of 2′ from Jupiter; there were intervals of 1′ only between Jupiter and the nearest satellite, and between the satellites themselves, west of Jupiter. All the satellites appeared of the same size, and though small they were very brilliant, and far outshone the fixed stars of the same magnitude.

. . . .

These are my observations upon the four Medicean planets, recently discovered for the first time by me; and, although it is not yet permitted me to deduce by calculation from these observations the orbits of these bodies, yet I may be allowed to make some statements, based upon them, well worthy of attention.

And, in the first place, since they are sometimes behind, sometimes before Jupiter, at like distances, and withdraw from this (*Turn to page* 163)

Moons of Jupiter—*Cont'd*

planet towards the east and towards the west only within narrow limits of divergence, and since they accompany this planet alike when its motion is retrograde and direct, it can be a matter of doubt to no one that they perform their revolutions about this planet, while at the same time they all accomplish together orbits of twelve years' length about the center of the world. Moreover, they revolve in unequal circles, which is evidently the conclusion to be drawn from the fact that I have never been permitted to see two satellites in conjunction when their distance from Jupiter was great, whereas near Jupiter two, three, and sometimes all (four) have been found closely packed together. Moreover, it may be detected that the revolutions of the satellites which describe the smallest circles round Jupiter are the most rapid, for the satellites nearest to Jupiter are often to be seen in the east, when the day before they have appeared in the west, and contrariwise. Also the satellite moving in the greatest orbit seems to me, after carefully weighing the occasions of its returning to positions previously noticed, to have a periodic time of half a month. Besides, we have a notable and splendid argument to remove the scruples of those who can talerate the revolution of the planets round the Sun in the Copernican system, yet are so disturbed by the motion of one Moon about the Earth, while both accomplish an orbit of a year's length about the Sun, that they consider that this theory of the constitution of the universe must be upset as impossible; for now we have not only one planet only revolving about another, while both traverse a vast orbit about the Sun, but our sense of sight presents to us four satellites circling about Jupiter, like the Moon about the Earth, while the whole system travels over a mighty orbit about the Sun in the space of twelve years.

Galileo Galilei was born in Pisa, Italy, in 1564 and died in 1642. Besides his invention of the telescope and astronomical discoveries, he constructed the first thermometer and was the first to state the law of falling bodies. When a small boy watching the lamps swinging in the cathedral, he conceived the idea of measuring time by the pendulum, thus laying the foundation for modern clocks. Galileo also first observed that the path of projectiles is a parabola. His theories brought him into conflict with the church and he was tried by the Inquisition. He was released, but lived in seclusion till the end of his life.

Science News-Letter, September 15, 1928

Foolproof Airplane Invented

Aviation

A new airplane that differs radically from previous models, that completely eliminates the possibility of stalling—the constant fear of the pilot of the ordinary plane—and that is as easy to control as an automobile, is one of the first products of the newly organized Daniel Guggenheim School of Aeronautics at the California Institute of Technology, Pasadena. It is being demonstrated at the air meet now in progress at Los Angeles, and has there proved a sensation.

The new plane was the original idea of Albert A. Merrill, who is not a professional airplane builder, although he has been connected with experimental aeronautics since his original association with Octave Chanute in 1891. Though he was told long ago that his idea was worthless, he persevered for more than 15 years, finally to prove its validity.

What first strikes one who sees the plane for the first time is its short stubby tail, which extends only for about four feet in back of the rear cockpit. There is no stabilizer, though there is a large vertical rudder. The wings are staggered, that is, the front of the lower wing is under the middle of the top one. There is a four degree positive decalage, as the aeronautic engineer calls it. This simply means that if the lower wing is horizontal, the upper one slants forward and upward at an angle of four degrees.

But most novel about the wings is the fact that they are not rigidly fastened to the fuselage. The two wings are fastened rigidly together, and pivoted to the fuselage about the rear spar of the upper wing. The result of this design is that the wings are stable in themselves, and not dependent upon the tail surfaces, as in the ordinary plane.

The angle of the wings to the fuselage is controlled by a crank handle by the pilot's side, connected to the wings by a sprocket and chain. This takes the place of the elevator of the ordinary plane. When the pilot wishes to ascend, he merely sets the wings at an angle and forgets about them until he is high enough, then he sets them level, and continues horizontally. If the engine stops, or if the pilot deliberately shuts off the power, the ship glides down along a slant line, but is always horizontal. Under such circumstances the ordinary airplane might stall and go into a tailspin, probably with disastrous results.

Associated with Mr. Merrill in the building of the plane was Dr. A. L. Klein, who did most of the fitting design, and Dr. Clark Millikan, who was responsible for the aerodynamic and primary structure design.

"The ordinary airplane is like an automobile that couldn't be steered if it was running slowly," said Dr. Millikan today to Science Service. "With the Merrill plane, however, longitudinal, or up and down, control is possible even at the lowest speeds. The control of the angle of attack, which is the angle at which the wings meet the wind, is independent of the air speed. As the pilot can always tell the angle of the wings, he can tell whether he is ascending or descending at once. A sudden gust of air, which would throw the ordinary plane out of line, and require a quick manipulation of the elevator to prevent trouble, merely lifts the entire plane without disturbing its horizontal position. Even with a heavy load in back, the stability of the ship is unaffected. These advantages might be summarized by saying that the pilot only has to control his movement in two directions—to one side or the other—instead of in three, which includes up and down as well. Only in the smoothest air, which is an exceptional condition, can this be said of the ordinary plane.

"The Merrill design also permits landing in a much shorter space than ordinarily, perhaps as short as 40 feet, as compared with the usual 200 feet or so. The take-off, however, requires as long a run as the usual type.

"For the previous model of the Merrill plane a glider was used, to which a small engine was later added. Then we built the present plane. At first this had an 80 horsepower engine, with which it was flown by an experienced pilot, who pronounced it far easier to handle than any plane he had ever flown. We have just installed a 100-horsepower engine for use in the demonstration at Los Angeles."

Science News-Letter, September 15, 1928

Egg yolks contain vitamin D, the food factor that helps to safeguard children against rickets.

How to Make Your Own Radiovisor

Radiovision

Following is the first of a series of articles prepared by C. Francis Jenkins, motion picture and television pioneer, telling how to build a radiovisor to see the television programs now being broadcast from a number of stations. Though the best television pictures or radiomovies are still very crude, there is a fascination in receiving them that equals that of the first crystal set days of broadcasting when the best was very poor according to modern standards.

By C. Francis Jenkins

The telescope enables us to see to great distances, but only along straight lines. As our only long straight lines lead away off into space, telescopes are necessarily pointed skyward.

But with radiovision, we can see along curved lines; we can see around obstructions, and over mountain ranges. One day we shall even see around the earth! What a stimulus to peace between nations!

Then folks in California and in Maine, and all the way between, will be able to see the inaugural ceremonies of their President in Washington; great football games, and the struggle for supremacy in our national sport, baseball.

Radiovision as a pantomime story-teller is ready to come to our firesides. It will be a fascinating teacher and entertainer, without language, literacy, or age limitation. It will soon be a visitor to the old homestead bringing photoplays, the opera, and a direct vision of world activities.

Only a few months ago such an attainment was pronounced impossible of realization within this generation. But the promise of radiovision entertainment by Christmas, made from several sources under the stimulus of competitive development, now seems certain of realization.

The first public demonstration which proved conclusively that this could be done, was made three years ago, on June 13, 1925, when readily recognizable moving objects in the Naval radio shack, NOF, at Anacostia, were seen in my laboratory in Washington, by Secretary of the Navy Wilbur, admirals of the Navy; Acting Secretary Judge Davis and Wm. D. Terrell, of the Department of Commerce; and by Dr. George K. Burgess, director, and Secretary H. D. Hubbard, secretary of the Bureau of Standards, and many others.

Radiovision is not visionary, or even a very difficult thing to do; speech and music are carried by radio, and sight can be so carried just as easily. For radio is not a noise, it is a carrier, comparable to copper wires extending in every conceivable direction from the broadcast station.

Simple subjects are being broadcast just now; more elaborate pictures will follow; i. e., action scenes, subjects, and ultimately picture stories in pantomime.

Doubtless the story of motion picture entertaiment in the theatre will be repeated in radiomovies in the home.

Silhouettes only at present are being sent from the Jenkins Laboratory station, 3XK at Washington; later, halftone pictures will be broadcast. Picture subjects and picture stories, in silhouette, are easier for the beginner to pick up; and obviously the width of the picture-frequency band is very much less.

But it has been discovered, in repeated broadcasts of radiomovies, that stories in silhouette by radio are just as entertaining as movie cartoons in the theatre.

Such broadcasts, combining the pantomime fascination of motion pictures with the intriguing mystery of radio, will build up a demand never before equalled in the history of human entertainment.

Nor has any invention ever had so much anticipating publicity; a publicity which antedated the actual completion of its successful attainment by fifty years.

For that reason, now that it is done, there probably exists a latent interest in visual radio which will unexpectedly burst into a torrential demand for receivers.

Because such sets are not available, it is expected that amateurs all over the country will be building their own motion picture receiving sets.

This series of articles will show the simplicity of this mysterious thing, radiovision and television. It will tell how you can make an inexpensive receiver, if you are clever in the use of common tools. It will allow you to anticipate the day when radiovisors will be as common in the home as audio-receivers are now.

Science News-Letter, September 15, 1928

WHAT TO SEE BY RADIO

WGY, Schenectady, N. Y.; General Electric Company; 380 meters, 790 kilocycles. 24 lines per picture. 20 pictures per second. Tuesday, Thursday and Friday, 12:30 to 1:00 p. m., E. S. T.; Tuesday, 10:30 to 11:00 p. m., E. S. T.; Sunday, 9:15 to 9:30 p. m., E. S. T.

Sunday and Friday transmission is simultaneously on 21.96 meters or 13,660 kilocycles; Tuesday and Thursday transmission simultaneously on 31.4 meters or 9550 kilocycles, through 2 XAF, 2 XAD or 2 XO.

WRNY, New York City; Experimenter Publishing Co.; 326 meters or 919 kilocycles. 44 lines per picture. 10 pictures per second. Daily, every hour on the hour for 5 or 10 minutes.

1 XAY, Lexington, Mass.; Donald R. Laffin; 51 to 62 meters or 4900 to 4700 kilocycles. 48 lines per picture. 15 pictures per second. No regular schedule at present as new apparatus is being installed.

2 XAL, New York City; Experimenter Publishing Co.; 3091 meters or 9700 kilocycles. Transmits simultaneously with WRNY.

3 XK, Washington, D. C.; Jenkins Laboratories; 46.7 meters or 6420 kilocycles and 186 meters or 1605 kilocycles. 48 lines per picture. 15 pictures per second. Monday, Wednesday and Friday, 8 to 9 p. m., Eastern Standard Time, Radiomovies. Transmission is done simultaneously on both frequencies.

4 XA, Memphis, Tenn.; WREC, Inc.; 120 to 125 meters or 2500 to 2400 kilocycles. 5000 watts. 24 lines per picture. 15 pictures per second. Irregular experimental schedule.

6 XC, Los Angeles, Calif.; Pacific Engineering Laboratories Co.; 65.22 to 66.67 meters or 4600 to 4500 kilocycles. 500 watts. 36 lines per picture. 18 pictures per second. Will start about middle of September; daily, 10:30 to 11:30 p. m., Pacific Standard Time.

8 XAV, Pittsburgh, Pa.; Westinghouse Electric and Manufacturing Co.; 62.5 meters or 4798 kilocycles. 60 lines per picture. 16 pictures per second. Radiomovies. Irregular transmission at present for experimental purposes.

9 XAA, Chicago, Ill.; Chicago Federation of Labor; 62.5 meters or 4798 kilocycles. 48 lines per picture. 15 pictures per second. Monday, Wednesday, Thursday and Friday, 9:00 to 10:00 a. m., Central Standard Time. Broadcasting only frequency chart at present, but radiomovie equipment is being installed and will be in operation shortly. Owners also operate WCFL, 483.6 meters or 620 kilocycles.

Glances at New Books

Heredity and Child Culture—Henry Dwight Chapin—*Dutton* ($2.50). The popularity and usefulness of this book is attested by the fact that this is a new and enlarged edition. The part played by heredity and environment in the making of an individual are the themes discussed practically and intelligibly. Henry Fairfield Osborne, in a foreword, strikes the keynote, saying: "It is very important that all parents, all teachers, and all physicians should understand the interlocking relations of heredity and environment."

Eugenics—Euthenics
Science News-Letter, September 15, 1928

A Teacher's Manual of Physical Education — Henry Panzer—*Barnes* ($2). This is one of the old-style manuals reissued, covering gymnastics for boys, arranged according to ages. There is a distinctly foreign note in the construction of some of the sentences and in the material emphasized.

Physical Education
Science News-Letter, September 15, 1928

The Pacific—P. T. Etherton and H. Hessell Tiltman—*Little, Brown* ($3). A comprehensive survey of present conditions in the Pacific and countries bordering it, with a forecast of future developments there. Lieut.-Col. Etherton served as English Consul-General in Chinese Turkestan and as Assistant Judge of the Supreme Court for China. The book is illustrated, but a map of the region would have added much for the average reader, rusty on his geography.

Sociology-Economics
Science News-Letter, September 15, 1928

The Nervous Child and His Parents—Frank Howard Richardson—*Putnam's* ($2.50). Explains in simple language what the nervous child is, why he is nervous and what to do about it. The book is convincingly written by an authority in the field and is delightfully illustrated.

Psychology-Child Hygiene
Science News-Letter, September 15, 1928

Safari—M. E. Johnson—*Putnams*. To Americans only a trifle more than a generation removed from the days when vast herds of bison and pronghorn swarmed on the Western plains, this book by a veteran at the game of travel in the African country will have a special appeal.

Travel
Science News-Letter, September 15, 1928

Italians Resurrect Cyrene

Archæology

The ruins of five ancient cities of Cyrenaica in northern Africa, forming a link between the much-studied Egyptian civilizations to the east and the region being explored by the French in Tunis, are now being dug out of their age-long burial in the sand by expeditions under the auspices of the Italian government.

The name of at least one city of the region is familiar to every Sunday School student, for it was from Cyrene that Simon came, whom the soldiers compelled to bear the cross after Jesus on the way to Calvary. Archæological work in what is now Italian Africa was forbidden during the centuries of the old Turkish dominance, but now the restrictions are removed and the excavations are going forward rapidly.

The region of Cyrenaica was originally colonized by the Greeks during the seventh century before Christ, and during the period of Greek ascendancy was a place of high civilization. It was in its decline at the time of Christ, and a few years later became the scene of violent conflict between the Greek populace and Jewish settlers.

Science News-Letter, September 15, 1928

Light on Infections

Medicine

A medical progress note prepared by the American Association for Medical Progress.

Hitherto most of the study of susceptibility and resistance to disease has been confined to individual diseases. In the *Journal of Experimental Medicine,* Dr. Louise Pearce publishes a series of articles on the reciprocal effects of concomitant infections. Vaccinal inoculations of rabbits were performed simultaneously with syphilitic inoculations. The ensuing syphilis proved to be extremely severe; not, it would appear, as the result of increased susceptibility, but rather as the result of decreased resistance on the part of the animals. Apparently this is a field in which further studies may be expected to yield fruitful results.

Science News-Letter, September 15, 1928

Make Gas from Lignite

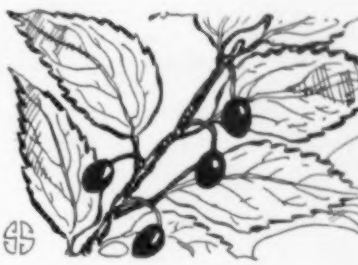
Chemistry

Gas for fuel and illuminating purposes can be made satisfactorily from lignite, recent experiments at Marburg on the Drau in Styria indicate. This work is being watched with much interest by Austrian engineers and industrialists, because up to the present Austria has had to import high-grade anthracite for its gas works.

Science News-Letter, September 15, 1928

Nature Ramblings
By Frank Thone

Natural History



Hackberry

One of the most widely distributed of American forest trees, even though not an especially abundant one, is the hackberry. Its several New World species range from Southern Quebec westward as far as Washington and Oregon and southward into Texas and Florida. On the Atlantic seaboard it is not very plentiful, but scattering specimens keep one reminded of its presence. It prefers the deep, rich soil of moist river terraces, though it will grow well in cultivation almost everywhere.

It is a really handsome tree, with straight, clean-cut trunk usually a foot or so in diameter, though occasionally reaching as much as three or four. The bark is unmistakable—rough, ridged, pebbly. No other tree has a bark quite like it. The twigs are fine and slender, often afflicted with the fungus disease known as witches' brooms. The leaves are more or less like those of the elm, to which the tree is rather closely related.

The hackberry is used occasionally as a street tree, although its trick of striving for height without a branching trunk does not make it a favorite for that purpose. No planting scheme should ignore it entirely, however, because it is one of the most characteristic of American trees.

Because of its scarcity in most parts of the country, it has but little use as lumber. The wood is heavy and soft, without much strength, but yields itself readily enough to working. It finds some utilization in the making of cheap furniture, boxes, loose barrels, and similar more or less lowly occupations. But it is better left alive than killed for such nondescript ends.

Science News-Letter, September 15, 1928

New Craftsmanship Born of Science

General Science

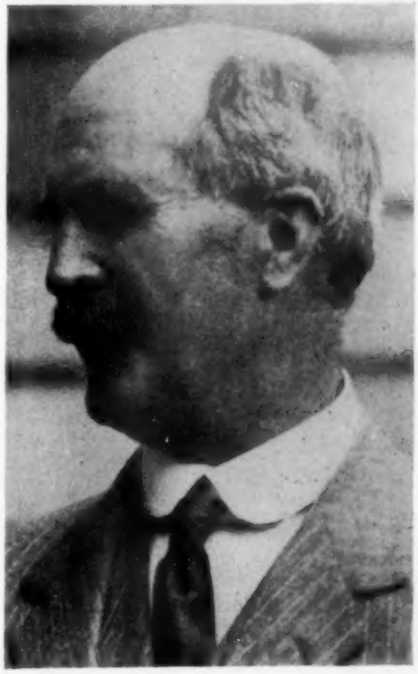
Following are the first reports of the annual meeting of the British Association for the Advancement of Science at Glasgow, September 5 to 12. Further reports will follow in next week's issue of the SCIENCE NEWS-LETTER.

The progress of industry, giving necessities and conveniences to millions, has within it the germs of its own decay unless scientific research is brought to its support.

This was the warning uttered by Sir William Bragg, eminent British physicist, in his presidential address before the British Association for the Advancement of Science. The continual development of new knowledge, new ideas, new processes, new machines, Sir William said, is the price of the continued existence of civilization as we know it. Periods of mass production, which take advantage of advances made in science, may themselves mark a lull or pause in scientific advance. Indeed, they really make such pauses necessary, for mass production is predicted upon the long-continued and high-speed repetition of processes which have been scientifically brought to a high pitch of efficiency, but which can not be changed during operation without slowing down or stopping production.

Basic to modern industry is a new craftsmanship founded on science, expressing itself as a function of organizations rather than of individuals as was the case with the old craftsmanship, the speaker declared.

"As a people departs from its primitive condition so also does its craftsmanship. I would ask you to consider the nature of the change. The elements of craftsmanship in its original form center round the individual. In his brain is the knowledge and imagination, in his hands is the skill, and round about him lie the materials and the tools of his craft. But as the years go by it becomes impossible that all the knowledge and all the technical skill should be found in one person, and all the tools be owned by him. The craftsman becomes an association of men, a great manufacturing firm, even, we might say, a nation, if all the members of the nation contribute through government intervention and control to the maintenance of some industry. Many hands, working in an alliance which is often unconscious, are employed in bringing a product to its finished form. It is a long step from the simple workshop of the old single-handed craftsman to the vast complex factory of modern industry."



SIR WILLIAM BRAGG, K.B.E., F.R.S., President of the British Association for the Advancement of Science

Chemicals, shining in the dark after exposure to proper light, may contain the secret of how the green leaf turns waste carbon dioxide from the air and water from the soil, through the use of the sun's energy, into food. This, the world's basic life process, has been the subject of study by Prof. E. C. C. Baly of Liverpool University. Professor Baly announced the discovery of an analogy between photosynthetic and photoluminescent processes. Highly activated molecules of matter, as they undergo chemical reactions in photosynthesis, emit critical quanta of radiant energy as visible light in photoluminescence.

Synthetic Sugar

Professor Baly recently made sugar out of carbon dioxide and water in a glass vessel in his laboratory. Thus the test tube was made the equivalent of a plant for the first time in history. Now he contributes a new radiation theory of chemical reaction based on the work of Einstein, Perrin, Lewis and other great physicists. Thus the chemistry of life is firmly wedded to the physics of light.

The day when synthetic men and women may be made in the laboratory, or even when artificial protoplasm may be manufactured and endowed with life is still far distant, in the opinion of Prof. J. Bronte Catenby of Trinity College, Dublin. Though the dream of laboratory-made life is at least as old as the Middle Ages, and has been revived in various forms since the development of modern chemistry has revolutionized physiology, it must still remain a dream, and even become a more remote dream than ever, because scientists are realizing the vast complexity of even the simplest cell.

Not only is the protoplasm within the cell highly complex in its chemical makeup, but to the practiced eye of the biologist it shows a highly developed structure where the tyro looking through the microscope will see only a bit of uniform mucilaginous substance. Professor Catenby announced the discovery of small specialized bits of substance within the cells, called organellæ, composed of lipoids. Lipoids are bodies chemically related to the fats. The existence of these lipoid organellæ has hitherto been unsuspected.

Only a person ignorant of cell structure now endeavors to apply a mechanistic philosophy, the speaker concluded.

Whence Sumerian Copper?

Solving the riddle of ancient trade routes with test tube and chemical spectroscope was the paradoxical procedure reported by a committee of museum workers headed by H. J. E. Peake. Archæologists wanted to know where the men of Sumer, oldest of Mesopotamian kingdoms, got their copper. The records written in the bricks do not tell. So metallurgical chemists analyzed the weapons and implements these ancients used, and then sought through all the parts of Asia round about for copper deposits that would match their analyses.

The Sumerian copper contained a little nickel as an impurity, and the search for a vein of copper ore that contained nickel was taken up. It proved to be a long one. Ores from Persia, the Black Sea region, the Sea of Marmora, Cyprus, Egypt and Sinai were examined, but yielded no nickel. Finally an ore of the right quality has been found in the State of Oman, on the Persian Gulf corner of the Arabian peninsula.

Science News-Letter, September 15, 1928